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THE EFFECT OF SUGGESTION AND MENTAL STIMULATION UPON THE JUDGMENT OF LENGTH.

Thesis in part fulfillment of the requirements for the degree of M.L., University of California, May, 1902.

Joseph E. Brand, Ph.B.

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This paper is based upon a laboratory investigation of the two related problems as to the effect (1) of suggestion and (2) of mental stimulation upon the judgment of length. These two problems will be considered in order.

I.

The general method of the first investigation was for some caution or direction, such as, Don't Make Too Long, to be given in connection with the standard length, after which the subject reproduced this standard length to the best of his judgment. As the cautions used were groundless—such that the subject knew that to obey them would give no better results than to disregard them—they could act merely as pure suggestions. Further, as they were given by printed words, and not by voice or any other method of personal emphasis and influence, it is seen that the investigation was restricted to but one portion—the most unpromising—of this field of pure suggestion. The first problem, therefore, becomes, Do cold and lifeless suggestions, recognized as groundless, influence one's judgment of length?

We might expect a negative answer—the subjects often expressed themselves as convinced of the negative. At all events, in this most difficult field for the working of suggestion, extreme care must be exercised, and results showing but slight influence will be valuable and should satisfy us.

After detailing the manner of conducting the investigation, the data will be tabulated, and then the apparent inferences discussed.

As already indicated, the method followed throughout was that of the reproduction of lengths. A certain standard length accompanied by some "motto," was exhibited to the subject for a limited time. He then placed two small objects at a distance from each other judged by him to be equal to the standard length. This distance was measured. Other mottoes were used similarly with the same standard length, thus permitting a comparison of judgments. With proper precautions (mentioned later) any noticeable variation in results would then be due to the only variable in the causes—to the influence of the different mottoes used.

Two sets of apparatus were used in this investigation, that for the preliminary work being very simple. (See fig.1.) The subject stood at one side of a table 76 cm high and 70cm wide, and the conductor of the experiment at the other side

facing him. Black paper covered the table, and a screen of the same material stood upright near the conductor's side, leaving room, however, for him to place on his side of it two small white wooden cylinders (over a centimeter in height and in diameter) at a standard distance apart. Lying between the distance thus indicated and the screen, was placed a slip of white paper. (2.5cm x 19cm), having a motto printed upon it.

With due notice, the screen was raised for two seconds, the subject looked down and across the table at the standard length and motto, and then reproduced the length upon his side of the table by placing two wooden cylinders similar to those already described. The distance was measured by the conductor, and the subject removed the blocks until the time for the next judgment.

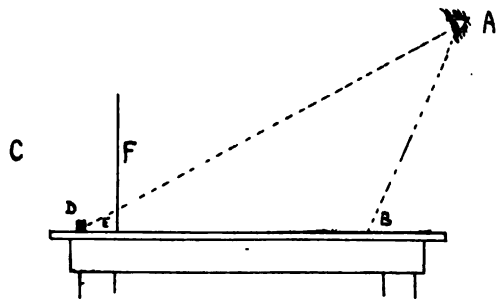


Fig. 1.—Diagram, First Apparatus.

A—*Eye of Subject*
B—*Place of Reproducing Lengths*
C—*Position of Conductor*
D—*One of Two Cylinders Indicating Standard Length*
E—*Position of Motto*
F—*Removable Screen*

The subject was thus kept in ignorance of the lengths both of the standards and of his reproductions. Moreover, both standards and reproductions were removed from his viewas soon as possible, so as not to affect subsequent judgments. The standard lengths were various—eight in number, given often in groups of ten, in which case two were repeated—ranging between 11cm and 30cm. After the ten had been exhibited with one motto they were repeated with a second, and so on. As a rule, all the mottoes were used each day, so that all might be affected equally by any peculiar state of the subject on any particular day. They all occupied approximately the same extent of the surface of the white slips. In order to get results without the use of any caution, and yet under ~~other~~ otherwise similar conditions, a "nonsense" motto was used. This was a piece of white paper the same size as that for mottoes and equally written upon, but with meaningless lines and dashes.

The data obtained from the use of this apparatus is tabulated in Group A, Tables I and II.

In using the second set of apparatus, the subject sat at one end of the table and placed his little wooden cylinders, or pegs, upon a horizontal ledge projecting from a vertical background extending to such a height that he could just easily look over it at the vertical exhibiting apparatus at the other end of the table. Thus the background of the standard exhibit-

ed(A) and that of the place of reproduction (B) were parallel, while the line of sight was at right angles to each, being about horizontal. Both exhibiting and reproducing devices were of black bristol-board, supported by wooden frames. A slight upward projection (D) at the front of the reproduction ledge

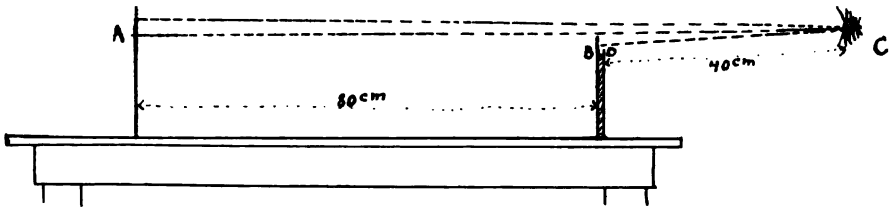


Fig. 2.– Diagrams, Second Apparatus.
A– Exhibiting Device
B– Reproducing Device.
C– Position of Subject

prevented the subject from seeing the scale on the top of the ledge, from which the readings were taken. ¶ The exhibiting device was more complicated in structure, but was simple in action. Viewed from the subject's end of the table, it consisted essentially of an upright screen with two long, narrow, horizontal openings in it. (Fig. 3). Through the lower opening, ~~lower,~~ (and close to it) appeared the motto; through the upper appeared the standard length, indicated again by two white pegs, with black paper behind, thus giving much the appearance of two small squares of white upon a black background. But the subject could never see both motto and standard length at once. A narrow sheet of black bristol-board, (Fig. 4.) with one long, narrow, horizontal

opening in it, was arranged to slide up and down on the front

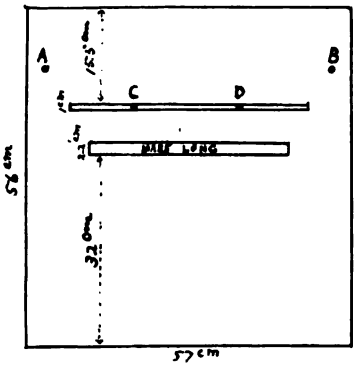


Fig. 3.— Front View of Exhibiting Device, Movable Screen Removed.

A, B— Guide Nails for Movable Screen

C, D— Pegs seen through Opening, and Indicating Standard Length

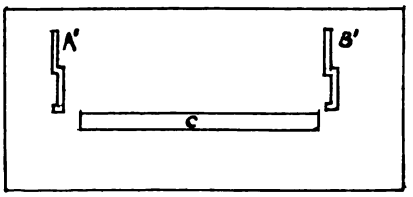


Fig. 4.— Movable Screen

A', B'— Guide Slits, through which A, B, project

C— Opening, revealing Motto or Standard, according to Height Screen is Raised

of the larger and stationary screen just described. When at its lowest position, it hid all; raised part way, it showed the motto only; raised to its highest, it covered the motto but exhibited the standard length. At each end was a vertical slit, through which a hook projected from the stationary screen to serve as a guide to the movable screen as it was raised or lowered. By jogs in the slits (see figure), the screen could be made to hang at any one of the three positions. Each slit and the hook projecting through it, was hidden from the subject by a strip of paper pasted upon the movable screen, along the side of the slit and bent over it. On the back of the exhibiting device, through a square rod of wood A (Fig. 5,), the points o f wire nails which had been driven through it projected upward at intervals of 1cm. From the back of this rod a background of black paper, C, extended upwards. The screen ~~in~~

Fig. 5.— Side View (Sectional) of Screen shown in Fig. 3.
F,F— Front, seen by Subject
R,R— Rear—Operators Side

in front also extended slightly above the rod, so that the nails were hidhen from the subject. Two wooden pegs (one shown at B, Fig.5), .8mm in diameter and several centimeters long, covered with white paper, and provided with nail punctures in the bottoms so as easily to be placed on the nail points, were used to indicate the various standard lengths.

Along the back of the square rod D a strip of paper was tacked so that any one, E, of the strips of paper with the mottoes could be inserted in the pocket thus formed. The mottoes were made of printed capital letters 1.2cm high, pasted on strips of white cardboard. The nonsense motto consisted of the letters ZWP FJVIC BGZX ASYE. The motto itself extended 28cm for all except Make Short, and Make Long, which were 16cm and 15cm respectively. Thus the subject saw a motto printed in black upon a white background, the size of the latter being determined by the size of the aperture in the black screen F,F. The mottoes, like the distances, always appeared in the middle of the opening for them, so that a symmetrical view was always presented.

The apparatus was operated as follows: The table was so

placed with reference to the windows that each of the two pegs indicating the standard length appeared to the subject to be illuminated equally on its right and left sides, so that they would indicate distances as truly as would points. A pendulum was kept swinging to the rear of the subject, in view of the operator. The movable screen being at its lowest position (hiding all) and the proper motto being at E, the pegs B were placed at the required distance apart. Then the operator, still standing at his end of the table and facing the seated subject, after due warning, smartly raised the screen (by touching its ends), so that the motto was exposed for two seconds; then raised it to its highest, so that the standard distance and that alone, was seen for two seconds; then lowered it so that the motto was again seen, and left this exposed. After seeing the motto the second time, the subject immediately placed his pegs at the adjudged distance, and the operator wrote down the readings, and returned to his post to repeat the process.

The experiments with this apparatus were made on eleven different days on one subject and on ten with the other, and were scattered over a period of nearly two and one-half months, a month's interval occurring between the seventh and eighth days. Before this interval four standards were used—16, 22, 28 and 34cm.—and after it again four—for subject Miss C. 24, 26, 30, 32, and for Mr. Y. 12, 14, 18, 20. The change was made so as to

prevent any standard from becoming so fixed in mind as to resist the influence of the suggestions, and the two subjects were given different ones because an examination of previous results seemed to indicate that the longer distances would give more decided results with Miss C, and the shorter with Mr. Y.

Each day from about 36 to 48 judgments were taken. A given motto was used six times in succession. Suppose seven different mottoes were to be used on a given day. A four-sided peg with one of the four standards written on each side would be twirled six times, and the six results written in order. These six standard distances would then be exposed one after another with the same given motto; then in reverse order with a second motto; and so on till the seven mottoes had been used. The next day the order of the mottoes would be altered, so that the one coming first on one day would not have that advantage the next.

Tables I and II give in detail the results of this investigation. Instead of finding the average lengths reproduced with different mottoes, it was deemed much simpler to interpret the data by aggregates. The number tabulated under a given motto and after a given day, is, therefore, the sum of all the judgments taken that day for that motto. The sums in each table are arranged in four groups. Group A consists of the

results from judgments taken with the ~~just~~ first and provisional set of apparatus. The other groups are separated from one another by the different mottoes used, and Groups C and D are further distinguished because of the month's interval between them. For convenience in inspecting the tables, at the close of each group, totals are given for such columns as it is desirable to compare. As in some cases the mottoes used on different days were not the same, only such days are included in forming the totals as would cause the various totals on a given horizontal line to be strictly comparable.

TABLE I. (Based on 650 judgments. Subject, Miss C.) See Explanation Preceding.

	DAY OF GROUP	NO. JUDGMENTS EACH MOTTO	STANDARD. (SUM)	NONSENSE MOTTO	"MAKE IT RIGHT"	"MAKE SHORT ENOUGH"	"DON'T MAKE TOO LONG"	"MAKE LONG ENOUGH"	"DON'T MAKE TOO SHORT"	"MAKE SHORT"	"MAKE LONG"
	1	2	3	4	5	6	7	8	9	10	11
GROUP A (Eight different standards 11–30 cm long were used in this Group.)	1	9	189	199	—	—	212.7	—	—		
	2	8	167	179	—	—	—	180.7	—		
	3	10	202	221.5	—	227.0	225.0	223.5	224.0		
	4	10	202	218.	—	224.5	214.0	220.0	223.0		
	5	10	202	—	—	220.0	221.5	216.0	221.0		
	6	15	320	343.6	345.3	—	341.5	—	342.9		
Sum of Days— 3,4,5	----	30	606	—	—	671.5	660.5	659.5	668.0		
3,4,5,6	----	45	926	—	—	—	1002.0	—	1010.9		
3,4,6	----	35	724	783.1	—	—	780.5	—	789.9		
GROUP B (Standards were 16,22, 28, and 34 cm.)	1	11	248	—	—	—	—	—	—	259.2	258.3
	2	16	322	—	—	—	—	—	—	302.5	305.2
	3	24	588	—	—	—	—	—	—	584.0	597.6
	4	24	660	—	—	—	—	—	—	650.7	680.3
Sum	----	75	1818	—	—	—	—	—	—	1796.4	1841.4
GROUP C (Standards as in Group B)	1	8	200	216.6	"LIFE IS REAL WHERE" 205.0	—	210.2	—	211.7		
	2	9	210	196.2	202.1	—	196.3	—	205.4		
	3	9	204	200.5	198.2	—	194.3	—	202.1		
Sum	----	26	614	613.3	605.3	—	600.8	—	619.2		
GROUP D (Standards were 24,26,30,32 cm)	1	6	170	—	—	—	183.2	—	175.3	172.0	185.5
	2	10	276	279.1	279.1	—	284.6	—	280.5	279.0	279.6
	3	7	206	209.0	211.6	—	221.7	—	213.6	203.3	212.5
	4	6	162	165.6	157.3	—	165.2	—	156.2	164.5	170.0
Sum of Days— 1,2,3,4	----	29	814	—	—	—	854.7	—	825.6	818.8	847.6
2,3,4	----	23	644	653.7	648.0	—	671.5	—	650.3	646.8	662.1
TOTAL for C and D, (except D,1)	----	49	1258.	1267.0	1253.3	—	1272.3	—	1269.5		
TOTAL, A (2), C, + D	----	100	2354	—	—	—	2457.5	—	2455.7		
TOTAL for B and D	---	104	2632	—	—	—	—	—	—	2615.2	2689.0

TABLE II. (Based on 598 judgments. Subject, Mr. Y.)

	DAY OF GROUP	NO. JUDGMENTS EACH MOTTO	STANDARD. (SUM)	NONSENSE MOTTO	"MAKE IT RIGHT"	"MAKE SHORT ENOUGH"	"DON'T MAKE TOO LONG"	"MAKE LONG ENOUGH"	"DON'T MAKE TOO SHORT"	"MAKE SHORT"	"MAKE LONG"
	1	2	3	4	5	6	7	8	9	10	11
GROUP A (Eight standards, 11–30 cm long, were used in this trmp.)	1	9	189	176	—	—	176.5	179.7			
	2	10	202	188	—	197	188.	192.5	190.5		
	3	10	202	186.5	—	191	190	194.5	186.5		
	4	15	320	297.6	303.8	289	293.8	—	289.2		
Sum of Days— 2,3,4	----	35	724	672.1	—	—	671.8	—	666.2		
2,3	----	20	404	374.5	—	388	378.0	387	377.0		
GROUP B (Standards were 16, 22, 28, and 34 cm long)	1	21	534	—	—	—	—	—	—	503.3	487.8
	2	22	538	—	—	—	—	—	—	499.9	491.0
	3	19	514	—	—	—	—	—	—	499.8	500.9
	4	20	524	—	—	—	—	—	—	487.2	488.5
Sum	----	82	2110	—	—	—	—	—	—	1990.2	1968.2
GROUP C (Standards as in trmp 8)	1	11	320	283.9	LIFE IS REAL WHERE 276.8	—	285.1	—	287.8		
	2	11	278	252.5	248.8	—	258.5	—	255.6		
	3	9	198	176.5	178.1	—	175.1	—	172.2		
Sum	---	31	796	712.9	703.7	—	718.7	—	715.6		
GROUP D (Standards were 12, 14, 18, 20 cm)	1	6	48	94.7	91.7	—	92.0	—	94.3	92.2	92.8
	2	6	90	86.6	86.3	—	89.8	—	88.1	85.6	92.4
	3	6	102	94.9	94.3	—	94.3	—	91.0	91.4	95.0
Sum	----	18	290	276.2	272.3	—	276.1	—	273.4	269.2	280.2
TOTAL for C+D	----	18 49	1086	989.1	976.0	—	994.8	—	989.0		
TOTAL for A (exc. day 1), C + D	---	69	1810	—	—	—	1666.6	—	1655.2		
TOTAL for B and D	---	100	2400	—	—	—	—	—	—	2259.4	2248.4

From an investigation of these tables we arrive at the following conclusions:

1. Our original question is answered in the affirmative—cold, groundless suggestions do sometimes influence one's judgment of length to a degree capable of laboratory measurement. More specifically, the length judged equal to a given standard is different for different kinds of mottoes.

Miss C's judgments with the mottoes Make Short, Make Long give the most evident and consistent results. In our discussion of judgments we use the word "obeyed" to mean, for example, that with Make Short the subject gave shorter lengths than with Make Long. In Table I, columns 10 and 11, we find the grand totals show the mottoes were obeyed. In those columns are reported the results of 104 judgments with each motto, given on 8 different days. Noticing the totals for the several days, we find that on 5 days a decided obedience is shown; while on the three remaining days (B, 1st and 2nd; D, 2d) the differences are very slight, although even here obedience is favored on two of the days. Moreover, a similar majority for obedience is found in an examination of the 104 pairs of judgments (not given in the table) involved in forming these daily totals. A judgment with Make Long was compared with that one with Make Short which occurred in a corresponding place in the laboratory data. This was an arbitrary and legitimate method of noting the even-

series. Of the 104 pairs of judgments, in 65-or practically two-thirds—the mottoes were obeyed. It is highly improbable that this result could be due to accidental causes.

We thus find that grand totals, daily totals, and individual pairs of judgments, all unite as evidence for the existence of an influence by the mottoes.

Another example of an influence, but in this case towards "disobedience", is seen in Table II, columns 7 and 9. Here, again, the result indicated by the grand totals is favored on a majority of the days. The mottoes were disobeyed on 6 days and obeyed on only 3, and in the latter case by much smaller average differences than in the former.

Both of these examples exhibit what we shall frequently call "evenness of distribution" of the influence. Thus in the first, the existence of an influence towards "obedience", which was indicated by the grand totals, was favored also by the totals of a majority of the days, and further, by a majority of the pairs of judgments. Such "evenness" shows that the method of comparing totals is valid, for the latter are proved not to be the result of a few very abnormal judgments, but of an influence more or less ~~at work~~ steadily at work.

Further examination of the data leads to the second conclusion:

2. The same motto produces different effects according

to circumstances.

A few examples will make this evident. In Table II, if we examine columns 10 and 11, but in group B only, we find that the total of column 10 for this group is greater than that for column 11. Here also the daily totals (when differing to any extent at all) differ in the same way, and further, of the 82 pairs of judgments, 44 agree, 35 disagree, and 3 are neutral. We thus have the result of the group total strengthened by the evenness of distribution by days and by pairs of judgments. But the result is opposed to that of the same columns in group D. Nevertheless, in the latter we find the totals for each of the three days all agree with the group total, and the detailed data shows, further, that of the 18 pairs of judgments, 1 is neutral, 12 agree with the totals, and only 5 disagree. It appears, therefore, that a series of judgments may break itself up into groups, each internally consistent, but antagonistic one to another, in which case the grand totals might be equal and yet the mottoes have exerted a decided influence, but in different directions at different times. An examination of groups A, C, D, in Table I, shows that for columns 7 and 9, group D is internally consistent, but opposes A and C. The previously mentioned columns 10 and 11 of Groups B and D, Table II, seem to show a gradual shifting from one result to the opposite.

Just why a given motto should have different effects at

different times we can as yet only surmise. Perhaps the mottoes are analyzed—broken up into parts, one of which is dominant at one time, another at another. It almost seems that sometimes the subject found in Don't Make Too Long, only Make Long, or Long, but at other times was affected by the motto as a whole. Now the internal consistency of the groups shows that the motto was viewed in the same manner for some time. It tended to tell the accustomed story, but if for any reason it once told a new one, it continued the new one for some time—habit entered. This analysis gave scope to the habit of being influenced by the motto in one direction for a while, then in an opposite one. The fact that at least a month's interval lay between groups that seem opposed, might allow for the lapse of the first habit. Again, even if there were no analysis, the subject might at one time be unconsciously animated to obey, and at another to act perversely. In a word, the direction of the effect of a motto may depend upon what part of the motto is active (due to analysis and habit), and upon the attitude of the subject; but, in view of the internal consistency in each of the opposing groups, such variation must not be taken to mean that the motto has no effect.

3. Two conclusions are suggested but not at all proved by this investigation: (1) That the mere words long and short, regardless of their context in a motto, sometimes tend to affect the judgment; (2) That a motto that means something or has an interest for a subject, gives greater lengths than a nonsense motto.

As to (1), only in groups A and D were such mottoes used as would furnish data bearing on the question. Group A will be considered a little further on. From D of both tables we have the following sums:

TABLE III.

MOTTO	TABLE I	TABLE II	MOTTO	TABLE I	TABLE II
Make Short	818.8	269.2	Make Long	847.6	280.2
Don't Make Too Short ...	825.6	273.4	Don't Make Too Long	854.7	276.1
	1644.4	542.6		1702.3	556.3

The difference between the two columns for I is 1-3/4% of their sum; for II it is 1-1/5% of the sum. Now the difference could not be due to obedience to the mottoes as wholes, for this would destroy the difference by reversing the readings for the negative mottos. It could not be due to the positive or negative character of the mottoes, for each column contains both kinds, and an equal number of judgments for both kinds. We are forced to the conclusion, therfore, that either the negative mottoes were analyzed—more broadly, the subject took an attitude to the negative mottoes different from that to the

positive,—or else the difference in results is due to the words short and long, regardless of context. As to Group A, in Table 1, cols. 6-9 indicate an influence by the two words, but here in an reverse direction, the long's being shorter than the short's by a difference of 3/4%. In A of Table 2, these columns give totals exactly equal. In comparing the results of Group A with those of Group D it might be noted that for the latter group the average standard of Table I was longer, and for Table II, shorter, than the average of the standards in the preliminary work. It may be mentioned that Miss C. remarked several times that Make Long seemed to emphasize the length of the standard. It would thus influence not by increasing the reproduced length over the standard, but by increasing the apparent length of the standard itself. This remark was generally made only of the longer standards. However, the most common attitude of the subjects was that they were not being influenced at all. The apparent existence of an influence by Short and Long led to a further investigation to be noticed a little later.

For (2), the effect of meaning and interest, column 4 of Tables I and II should be compared with the average of the other columns. It is seen that in Group A, the meaningless motto of Col. 4 gives results smaller than the average of the other mottoes. In C and D, the words, Life and Real Where were

chosen as being reliable to arouse curiosity, and thus to be the opposite of a nonsense motto, but it was soon seen from the remarks of the subjects (especially Miss C.), that the "Fiji" words, as she called them, of Col. 4, were more interesting, and that Life is Real Where was nearer our ideal contentless motto. For the real effect of meaning and interest as compared with absence of content, we should, therefore consider Life is Real Where as being contentless. These results are then given:

TABLE IV.

Subject	MOTTOES WITH CONTENT (Av. of Cols. 7 and 9, of Groups C and D, omitting Q. 1 of Table I)	MOTTO WITHOUT CONTENT (Column 5 of Same Days)	DIFFERENCE BETWEEN TWO PRECEDING COLUMNS IS OF THEIR SUM:
Miss C	12.70.8	12533	.7%
Miss Y	991.9	976.0	.8%

We see here that the results with the contentless motto fall below the average for mottoes with content, by a difference that is about 3/4% of the sum of the two sums compared. Moreover, of the six days involved with Miss C. the daily totals agree with the grand totals, on four days, are neutral once, and opposed only once; and with Mr. Y., of the six days, four agree, and only two disagree. On the other hand, Make It Right given on only one day, Sept. 13, and therefore supposedly of greater interest than the other mottoes, which had been seen for several days, gave the largest total of any given in that day, and this is true of both subjects. Here, then, is a strong suggestion that newness and interest tend to lengthen. This

gives corroborative evidence that for these subjects lack of content gave smaller results than did meaning and interest.

A feature worthy of attention is that although one subject continually gave results too long and the other too short, in the whole series of experiments, yet for both the rule that meaning and interest tend to lengthen results seems to hold—thus nonsense mottoes did not cause the judgments with them to be more nearly equal to the standard-more nearly correct—than were the judgments ~~subjects~~ with other mottoes. If such had been the case, with one subject nonsense mottoes would have given shorter, with the other longer, judgments than were given by the sensible mottoes. Instead, in both cases they gave shorter results, causing the one accustomed to fall below the true length to do so even more. Whether the law suggested by the results from these two subjects would hold generally, was investigated later, and will be considered further on as our second main problem.

From the facts brought out in considering (1) and (2) it seems almost ~~seems~~ as if the subject was satisfied with being affected in some one way—at one time by the words Long and Short, at another time by the amount of meaning and interest, at another by the desire to obey, again to disobey, and so on. It is probable, however, that more frequently these factors combine, some one predominating. Much depends, also, upon the individual subject.

Some laws even in this region can be discovered, however, as the sequel will show.

Effect of Long and Short.

The next investigation was made to reach a conclusion regarding the influence of the words Long and Short. For this a third form of apparatus was used. It consisted of the exhibiting device last described, but slightly altered, and of a reproducing device entirely new.

In the second apparatus the standard length was indicated by two wooden pegs placed on nail points at the back of the exhibiting device. In this third form the standard was shown by two bits of white paper, 4mm square, on a black bristol board card, which stood close against the slit through which formerly the pegs appeared. Different standards were provided for by having a different card for each, to be inserted when required. The reproducing device consisted again of a vertical screen of black bristol-board, but the judgment was recorded in an improved manner. Near the top of the screen was a horizontal slit (A), 7mm wide and 40.6cm long. At the left end of this slit was pasted

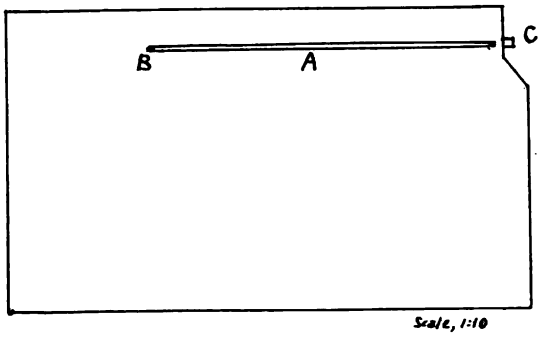


Fig. 6.- Recording Screen (Side toward Subject)
A- Slit
B- Stationary White Square
C- End of Slide

a square of white cardboard the same size as the squares used for indicating the standard. A long strip of bristol-board, with a similar white square upon it, was arranged to slide back and forth behind the slit, so that any desired length could be indicated by the two white squares. The slide was operated by the thumb and fingers placed at its right end. Its length was such that when pushed as far as possible to the left it extended slightly both to the right and the left of the screen. In this position its white square was hidden from view, having passed to the left of the left end of the slit. The stationary square could also be hidden by a small strip of black bristol-board hanging from the top of the screen. In this way nothing but a black field appeared before the subject, on the recording device, while he was engaged in looking over it at the exhibiting device. When the time came for him to register his judgment, he moved the little black strip hiding the stationary square slightly to the left, and then with his right hand pulled the slide to the right, bringing the second square into

view, and out to what he considered a proper distance from the left. If he wished to move it back and forth a little before coming to a final adjustment, he was allowed to do so.

Every effort was made to eliminate from the reproducing device anything that the subject might use as a point of reference by which to compare his different judgments. The hidden part of the slide extended farther to the left of the square upon it than the length of any possible judgment, so that its left end was never brought into view in the slit. The bristol-board edges caused by cutting the slit were carefully blackened. The slit was very much longer than would be needed in recording judgments, so that the ends were as far from the probable position of the movable square as was the other square itself, Hence the subject could not possibly be aided by making either end a point of reference. Thus, when making a judgment, the subject had before him only a uniformaly black surface with two white squares upon it. The only exception was that the black surface in the long slit was removed from the main surface by a distance equal to the thickness of the bristol-board in which the slit was made.

The operation of this third form of apparatus was practically the same as for the second. The motto was shown two seconds, then the standard length two seconds, then the motto again appeared and was left in view, only now the subject was

to gaze at it for two seconds before proceeding to the reproduction. This last has already been described. The conductor recorded the length, screened the motto that had been left in view, and prepared for the next exhibition; while the subject screened the stationary square on the recording device, pushed the slide back to its original position, and waited for the next exposure.

As has been mentioned, the first work with this apparatus was concerned with the effect of the mere words Long and Short Three mottoes were used, Long, Short, and a neutral one, xxxx, all in capitals and occupying the same length on the cards. Three standard lengths were used—17, 18 and 19cm. On the latter part of the work, all three were used each day; before this, but two a day. Four judgments were taken with one standard, then four with another, and so on, the order of using them being such that each was preceded about an equal number of times by each of the others. Thus for one day the order was, 17, 19, 18, 19, 17, 18, 17, 19, 18, 19, 17, 18. Another day another standard would come first. All the standards were used the same number of times on a given day. The order of the mottoes was independent of the order of the standards. Lot determined which of the three mottoes to use, subject to the two conditions that the same motto was not to be used more than four times in succession, and that toward the close of the hour they were to be so chosen as to give

the same daily total of judgments for each. In this way any difference in the condition of the subject on different days would not vitiate the results.

The number of subjects was four, three women and one man. The results in detail for the two showing decided influence, and a summary for all four are shown in Tables V and Vl.

TABLE V.

Miss K.

DATE	Standard	Times used	SUM STANDARD	SUM LONG	SUM SHORT	SUM XXXX
Sept. 18	17	3	51	47.8	48.4	48.3
	18	3	54	53.6	52.4	53.9
	19	3	57	54.8	56.2	58.0
			162	156.2	157.0	160.2
" 24	17	5	85	79.9	79.2	81.5
	18	5	90	84.4	84.3	85.1
	19	5	95	93.5	95.5	94.3
			270	258.8	259.0	260.9
" 25	17	6	102	94.6	98.6	98.3
	18	6	108	104.9	104.4	103.0
	19	6	114	107.5	113.6	111.7
			324	307.0	316.6	313.0
" 26	17	6	102	92.7	96.8	95.1
	18	6	108	106.6	107.2	105.0
	19	6	114	110.4	112.1	112.9
			324	309.7	316.1	313.0
Oct. 2	17	6	102	94.1	95.5	92.7
	18	6	108	101.8	104.5	103.8
	19	6	114	111.4	114.8	113.7
			324	307.3	314.8	310.2
" 4	17	4	68	58.1	62.3	60.6
	18	4	72	67.2	65.7	68.6
	19	4	76	72.7	73.4	73.2
			216	198.0	201.4	202.4
Grand Total		90	1620	1536.0	1564.9	1559.7

Mrs. M.

DATE	Standard	Times used	SUM STANDARD	SUM LONG	SUM SHORT	SUM XXXX
Sept. 5	18	6	108	108.3	103.2	108.8
	19	6	114	123.2	117.0	116.8
			222	231.5	220.2	225.6
" 6	17	7	119	118.2	113.0	118.5
	18	5	90	92.8	91.3	86.1
			209	211.0	204.3	204.6
" 11	18	8	144	144.6	140.5	141.7
	19	6	114	116.0	117.8	112.1
			258	260.6	258.3	253.8
" 13	17	8	136	139.8	134.6	137.8
	18	8	144	148.3	145.5	146.6
			280	288.1	280.1	284.4
Oct. 7	17	7	119	117.3	116.0	119.0
	19	7	133	130.2	134.3	134.7
			252	247.5	250.3	253.7
" 11	17	7	119	121.0	115.0	117.4
	19	7	133	136.7	132.5	138.0
			252	257.7	247.5	255.4
" 14	17	1	17	17.1	16.0	17.0
	18	3	54	50.3	48.9	52.9
	19	4	76	76.2	72.7	75.1
			147	143.6	137.6	145.0
Grand Total		90	1620	1640.0	1598.3	1622.5

Table VI.

Subject	No. of Judgments with Each Motto	SUM of Standards	SUM LONG	SUM SHORT	SUM XXXX	AVERAGE of LONG and SHORT	No. of Days — Total	on which — Long > Short	Long = Short (Diff. < 1.0)	Long < Short	No. of Daily Sums by Standards — Total	for which — Long > Short	Long = Short (Diff. < 1.0)	Long < Short	Difference between Long and Short is of their Sum:
B	90	1620	1672.7	1681.7	1673.2	1677.2	6	2	2	2	15	5	4	6	.27%
K	90	1620	1536.0	1564.9	1559.7	1550.4	6	0	1	5	15	1	4	10	.93%
M	90	1620	1640.0	1598.3	1622.5	1619.2	7	6	0	1	13	11	0	2	1.29%
S	90	1620	1617.3	1610.8	1620.3	1614.1	6	2	2	2	12	6	2	4	.20%

* This group of columns, like the group preceding it, reveals evenness of distribution of the influence. It, however, carries the investigation a step further, comparing, not daily totals, but sub-daily totals, i.e., the sums for a given standard on a given day. Thus each line of data in Table V is material for one comparison. (But to avoid giving undue weight to very small sums, those for standards 17 and 18, on Oct. 14, were combined with the corresponding one on Sept. 6, before comparison; and likewise those of Oct. 4 with those of Sept. 18.)

From this table it appears that two of the subjects, Miss K. and Miss M., were decidedly influenced by the mottoes. The magnitude of the difference in results would alone be good evidence of this. But in addition, grand totals, daily totals, and the totals for each standard each day, point to the same conclusion. Moreover, for all the subjects the relation between grand totals is well indicated by the relations holding in the daily and sub-daily totals. We seem warranted, then, in concluding that this investigation has shown (1) that the mere presence to eye and in mind of the word long or short influences the judgment of some subjects, and (2) that the influence varies both in direction and in extent with different individuals, some being unaffected, and of those influenced some giving longer or shorter judgments according as the word is long or short, and some doing the reverse. As to the influence of these words

compared with the contentless XXXX, we merely note that in three cases the latter gives a sum between those of Long and Short—a result in harmony with the conclusion that the latter do influence.

At this point it might be well to note a result not logically connected with our main problem, yet of some interest. It is that from the data given by the three different standards we secure quantitative evidence in support of the accepted belief that most persons tend unconsciously to emphasize differences. The following shows the method of securing this evidence (lengths are given in centimeters):—

Table VII.

Miss K.

Standard Used	No. of Times	Sum of Standard	Sum for LONG	Sum for SHORT	Sum for XXXX	Av. Sum for IV, V, VI	Difference Between Sum of Standards 17 and 18; also 18 and 19	Same as VIII, but decreased by per cent Subject decreases on the average*	Average Actual Difference between Sum of Standards 17 and 18; also 18 and 19
I	II	III	IV	V	VI	VII	VIII	IX	X
17	30	510	467.2	480.8	426.5	477.8	30.0	28.8	44.0
18	30	540	518.5	518.5	519.4	518.8	30.0	28.8	41.1
19	30	570	550.3	565.6	563.8	559.9			
Total:	90	1620				1553.5	60.0	57.6	85.1

*Average per cent of decrease is found from columns 3 & 7.

The extent to which the difference in the standards is emphasized is shown by the ratio between the totals in columns x and ix. For this subject the increase is 47.7%. Results from the four subjects show-

B	increases	difference	30.1%
K	"	"	47.7%
M	"	"	19.8%
S	"	"	27.8%

Thus all four subjects show a very decided emphasis of the differences. S. said he thought there were five or six standards; K. classified them into three.

II.

We now turn to the second of our two main problems: "What influence, if any, does mental stimulation exert upon the judgment of length?" Now novelty (if not so utterly foreign as to bewilder or rebuff) is admitted to arouse interest; and suggestiveness maintains it, though not necessarily in the suggestive object. Hence, if to novelty with its inherent attractiveness we add high suggestiveness, we get that which will arouse and maintain interest—something mentally stimulating. It is this state of being "highly alive", or "highly alert in general", as compared with a "humdrum" state, which we seek as the result of mental stimulation, as the expression is here used. In order to compare results from the stimulated and the non-stimulated

state, two series of judgments were taken, in one of which a new and highly suggestive motto was shown each time, while in the other a single tame motto, seen several times before the real experiment began, was used, so that it appeared again and again, a stale and uninteresting thing. Whether it was justifiable to assume that suggestiveness and novelty, admittedly stimulating at the moment, constituted a stimulus instead of a distraction to the subject when a second later the standard was exhibited and demanded attention, will be considered further on in connection with the data obtained. The series containing the repeating motto we designate the Repeater series, or R; the other, the Novelty series, or N.

It was first necessary to prepare a large number of mottoes for N. They were so selected as to be as suggestive as possible, while also being of equal length when printed. Thirty-six were made, of which the following are samples:

If I were only rich-	Never tell your age
Psychology and eating	Are white lies lies?
Prove you are alive	Santa Claus!-A fake!
Two and two are five	Lives of great men

For the Repeater series, The table is strong was selected. These mottoes, as in the previous experiments, were made on white card-board slips, but the printing was done by hand, a ruling pen (gauged to make a line 1mm wide) and India ink

being used. The mottoes all occupied a space 19cm long, and the letters, which were all capitals, were 1.5cm in height. If the end strokes of a motto were vertical (as in Lives of great men) the length occupied by the motto was shortened a millimeter or two at each end, as compared with the space allotted a motto with such end letters as in The furrow followed. The style of letter was the plainest possible—gothic, as understood by printers.

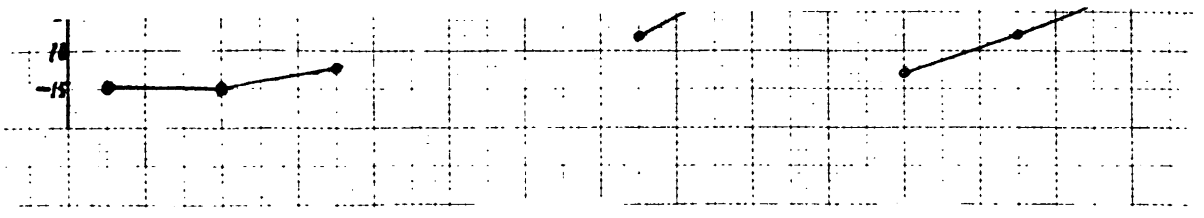
The operation of the apparatus was exactly the same as in the investigation upon Long and Short. Lot determined whether to show an R or an N motto, with the two restrictions that at the end of every twelve judgments half should be of each series, and that one series was not to be represented more than three times in succession (later changed to twice). As preliminary, the Repeater was shown six to a dozen times so as to be somewhat of an old story when the real work began. At the beginning of each day's work a few (generally one to three) preliminary judgments were taken. As a rule, 36 to 48 judgments were obtained each day from a given subject, the period of about 55 minutes being broken by two or three rests of several minutes each. After the thirty-six novel mottoes had all been used once, they were shown a second time, in a different order, and then a third time, so that each motto when last used had been seen twice before, while the Repeater had appeared at least 80 to

90 times. In this way the need of preparing a great number of of mottoes was avoided, while a comparison of results to be obtained for the first, second and third appearances might prove valuable. Thus if a difference in results for R and N diminished along with the decrease in novelty occuring in passing from the first to the third appearance, this would argue a causal connection between the difference and the novelty.

Of the seven subjects at least five seem to have been so influenced by R and N as to make the average length of the judgments differ for the two series. As a means of exhibiting the evenness of distribution of the influence, the judgments were compared in groups of nine pairs. The following table shows in detail the data from two subjects certainly influenced, and for comparison that from one seemingly unresponsive:

Appearance of Novel Series	No. Judgments Each Series	Sum of Standard	Miss K. Repeater	Novelty	N−R	Aver. R
First	9	162	151.4	151.8	+0.4	16.8
	9	162	147.1	156.3	9.2	16.3
	9	162	146.1	148.8	2.7	16.2
	9	162	150.3	151.2	0.9	16.7
	36	648	594.9	608.1	+13.2	16.5
Second	9	162	146.7	149.7	+3.0	16.3
	9	162	150.0	152.6	2.6	16.7
	9	162	150.3	152.6	2.3	16.7
	9	162	143.7	145.6	1.9	16.0
	36	648	590.7	606.5	+9.8	16.4
Third	9	162	146.9	149.4	+2.5	16.3
	9	162	145.4	193.1	−2.3	16.2
	9	162	150.4	150.4	0.0	16.7
	9	162	148.5	149.6	+1.1	16.5
	36	648	591.2	592.5	+1.3	16.4

Note.— The standard length w
the sum of 9 judgments with
series — this comparison by a
influence.



Appearance of Novel Series	No. Judgments Each Series	Sum of Standard	Miss K.			
			Repeater	Novelty	N—R	Aver. R
First	9	162	151.4	151.8	+0.4	16.8
	9	162	147.1	156.3	9.2	16.3
	9	162	146.1	148.8	2.7	16.2
	9	162	150.3	151.2	0.9	16.7
	36	648	594.9	608.1	+13.2	16.5
Second	9	162	146.7	149.7	+3.0	16.3
	9	162	150.0	152.6	2.6	16.7
	9	162	150.3	152.6	2.3	16.7
	9	162	143.7	145.6	1.9	16.0
	36	648	590.7	606.5	+9.8	16.4
Third	9	162	146.9	149.4	+2.5	16.3
	9	162	145.4	193.1	-2.3	16.2
	9	162	150.4	150.4	0.0	16.7
	9	162	148.5	149.6	+1.1	16.5
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Note.— The standard length w
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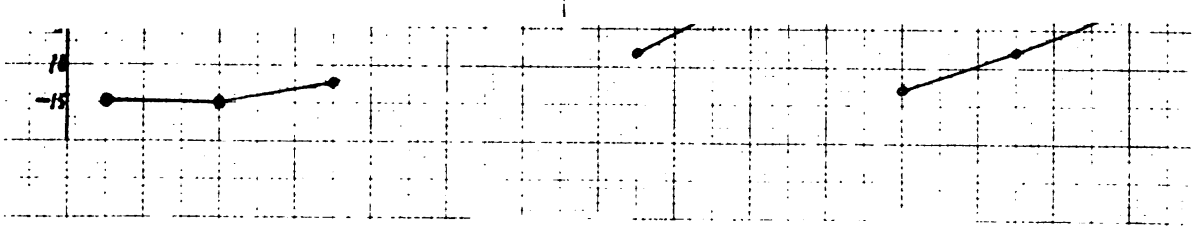
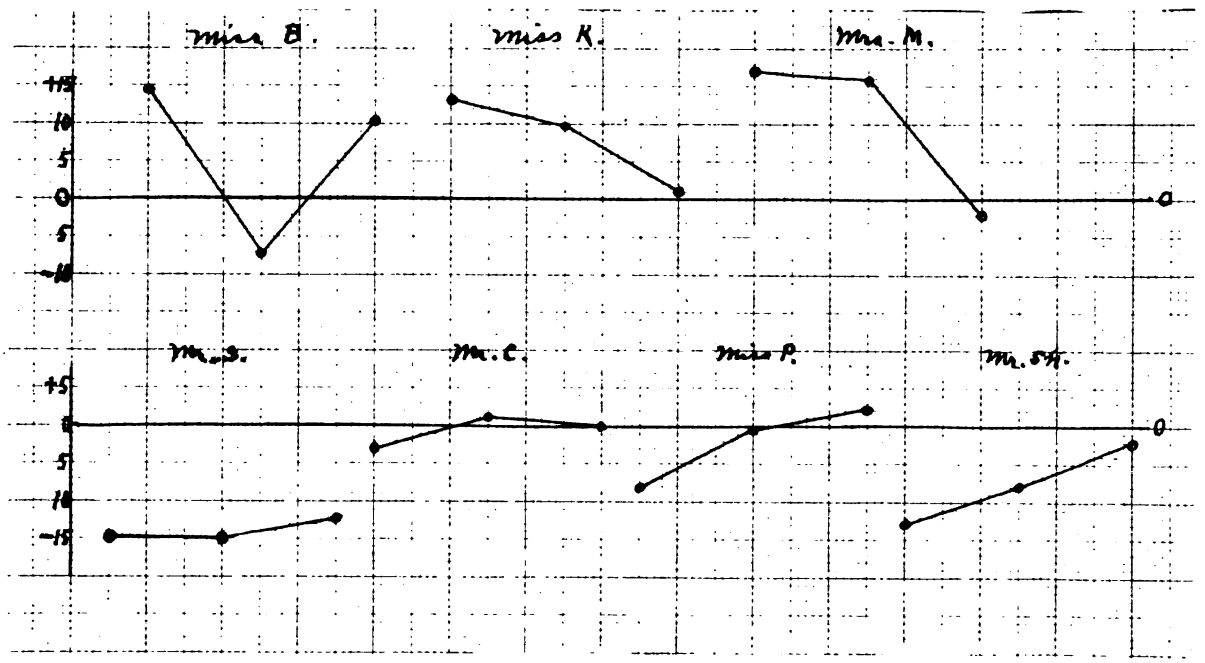


x

It will be noticed that the last column shows the differences between R and N for Mr.C.and Miss P. to be much less than those for the others,so that these differences are perhaps accidental. But even here the first appearance gives a difference larger than the second or third,showing apparently a decrease of influence. That,of the five others,all or nearly all were influenced, seems evidenced (1) by the size of the differences, (2) by the even distribution of the influence as already exemplified in the detailed table(Table VIII),and (3) by the diminution in the difference between R and N as the novel mottoes were repeated. The last is represented graphically below:

Behavior of Difference Between Results for R and N,for Successive Appearances of N.



The ordinates of the points indicated by the little circles represent the difference between the results for R and N, for the first (at the left), second and third appearances of N, as taken from the preceding table. Positive values indicate an excess of N over R. It is seen that the curves are in every case nearer the zero line at the third appearance than at the first, i.e., the difference between R and N is less at the third appearance than at the first. However, looking only for those subjects that give for the second appearance of the novel mottoes a result that is a consistent step in this decrease, we find three (K., M., Sn.). It will be seen that for them, however, the ordinates show much less decrease from the first to the second appearance (due to interest from recognition?) than from the second to the third appearance. Now S. resembles these three subjects in showing ordinates more nearly equal for first and second appearance than for second and third appearance. We may, therefore, add S. as a fourth subject, belonging to this type. Two of the others give results so small we hardly need consider them (C. and P.), so that only one of the seven (B.) seems to be an exceptional case. We conclude, therefore, that of the five who, from the size of the differences they ~~they~~ gave appeared to be influenced, four give evidence that the difference decreases as the interest-arousing power of the motto wanes, so that by the law of concomitant variation the

differences may be assumed to be caused by the stimulation.

The question now arises whether the different results from R and N were due to a difference in the subject's estimate of the standard, or to a difference in his muscular response in indicating his judgment. If the latter were the fact, then instead of having found for each individual the law governing the effect of stimulation upon him, we have only found the law for him when recording his judgments in a particular way. We therefore proceeded to eliminate the possibility that the laws found were only of the latter kind. Now if they were such, then apparatus involving practically no muscular activity would give virtually the same results for both R and N. Accordingly, the method was now so changed that the subject was not required to do any manipulating of apparatus. The operator set the slide in the recording screen to indicate a length approximately that of the standard, and hid it from the subject by a long strip of black bristol-board hanging from the top of the screen. After the motto and standard had been exhibited, the operator stepped again to this screen and raised it for about two seconds, whereupon the subject gave his judgment as to whether this length was greater than the standard, equal to it or less. Twenty-one new mottoes were prepared, and, as in the previous experiment, the series was used three times (four times with Miss K.). ¶ The method of taking and interpreting the data

varied with the different subjects. Preliminary work with Miss K. gave answers sufficiently different when but one length was repeatedly given for comparison with the standard, to allow interpretation by the method of right and wrong cases. Of course she was laboring under the delusion that a ~~whole series~~ variety of variables was being given, but this fact would not vitiate the results. It could only make her more susceptible to any difference in influence due to R. and N. With Miss P. the normal method of right and wrong cases was used, and with the others both this and that of small changes. It will be observed that by the latter method the length judged on the whole as equal to the standard could be determined and expressed numerically for both R and N, thus showing at once the effect of the novel mottoes upon the judgment. On the other hand, the method of right and wrong cases would not give directly any such lengths, as a basis of comparison, but it would give the relation (longer, equal or shorter) borne by one of them to the other. Thus if with N a certain length was judged to be shorter than the standard, but with R to the equal to it, then evidently to secure the judgment of equality with the standard a greater length would have to be shown for N than for R., In the method of small changes the steps were usually one millimeter (rarely two), and R and N were run parallel (but not with perfectly regular alternation lest the subject should know

what to expect), so that the length judged equal to the standard was obtained for both R and N nearly simultaneously.

The data secured in working by the method of small changes was given a second interpretation by the method of right and wrong cases. In this data, however, there was of course a zone of uncertainty, below which the answers were invariably, "Shorter", and above which they were always, "Longer". Only those answers lying within this zone were used as material for this second interpretation, the obvious reason being that the method of right and wrong cases is properly applicable only to regions of uncertainty.

The unstarred columns in Table X give the answers taken directly for the method of right and wrong cases, while the starred columns combine these answers with those taken primarily by the method of small changes (that is, with those the basis of Table XI, but interpreted as just explained.)

TABLE X.

Subject	Miss K		Miss P		Mr. C		*	*	Mr. Sn		*	*	*Mr. S	*
Series	R	N	R	N	R	N	R	N	R	N	R	N	R	N
Answers: "Shorter"	9	25	20	21	10	6	15	7	11	11	14	11	11	6
"Equal"	33	36	37	36	15	19	22	29	30	24	36	33	13	16
"Longer"	41	22	7	7	7	7	8	9	4	10	9	15	9	11
Totals	83	83	64	64	32	32	45	45	45	45	59	59	33	33
Distribution	6, 0, 0.		1, 1, 1.		1, 1, 0.		3, 1, 0		3, 0, 0.		4, 0, 0.		3, 0, 1.	
"Moves"	+35		+1		−4		−9		−6		−9		−7	

Note.— In the last line + means that the standard seems longer with N.

The last line in the above table interprets the data. A positive "move" is the change of an answer in R to one one step towards "Shorter" in N. Thus for Miss K., 19 answers of "Longer" change to "Equal" (19 moves), and 16 of these change to "Shorter" (16 moves), giving a total of 35 moves. Moves toward "Longer" are designated as negative. In the line entitled "Distribution," the first figure of the three indicates the number of days on which the trend was the same as in the total; the second, no trend-equality; the third, opposite trend; thus indicating the evenness of the distribution of the influence.

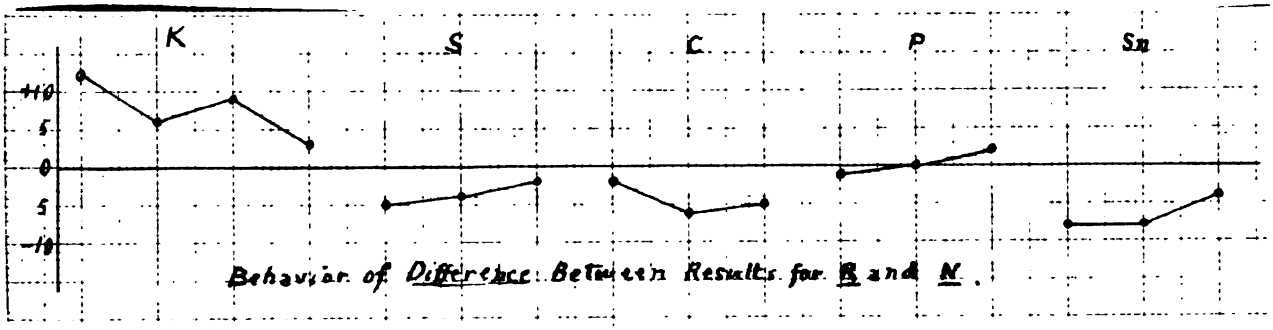
The following gives the results in those cases in which the method of small changes was used:

Table XI.

Series.....	R	N	Remarks
Subject-Mr. C.....	18.1	18.0	Result of average of three determinations, in each R giving, as here, a greater length than N.
Mr. S.....	17.3	17.1½	Only one determination made.
Mr. Sn.....	17.9½	17.9	Average of five determinations, two agreeing decidedly with this average, and three slightly opposed.

Examining these two tables we see that Miss P. gives practically no evidence of having been influenced, Miss K. gives decided evidence, while the evidence from the three others in Table X., though weaker, is greatly strengthened in every case by that in Table XI. Moreover, the former table shows evenness

of distribution through the daily results. Still further, every one of the four subjects apparently influenced gives results that agree with those of the previous experiment (see Table IX) — if N shortened in that, it does in these. And still further, there is some evidence, as in the previous experiment, that the difference in the results from R and N decreases with decreasing interest as the novel mottoes are seen for the second and third time. This decrease is grap' ically represented below:



Behavior of Difference Between Results for R and N.

circles in each graph represent, beginning at the left, the difference between the results for R and N, at first, second, and t third appearance, respectively. Positive ordinates mean N gave the greater results, i.e., favored taking a longer length as equal to the standard than did R. The magnitude of the ordinates was determined primarily by the number of "moves" during the corresponding appearance of the series of novel mottoes. However, for those subjects furnishing data for both Tables X and XI, from the data for the latter the magnitude of the difference between lengths judged equal to the standard with R and N, respectively, was noted for successive determinations of these two lengths. Then the magnitude of the difference at successive "appearances" of N, thus made evident, was compared with the figures shown by Table X, and the resulting values

were the ones used in the graphs for these subjects. From the graphs it will be seen that of the four subjects apparently influenced, three (K., S., Sn.) gave smaller differences between R and N for the third appearance of the novel mottoes than for the first, while the other subject (C.) gave for the third almost as great as for the second, and for both these a much greater difference than for the first appearance. On the whole the four subjects gave decreasing differences as novelty and interest decreased. (Compare with graphs on page 33).

We feel warranted, therefore, in accepting the data as evidence that four of the subjects were influenced by N without resort to muscular action in recording the judgment. Of these four at least three (K., S., Sn.) were influenced previously when muscular feeling entered. It now seems probable, therefore, that the difference in the results they gave for R and N previously was not conditioned upon the particular manner in which they recorded their judgments. In other words, the question at the outset is now answered—the influence affected their estimate of the standard and probably not to any appreciable extent the particular activities involved in recording the judgment. Of the two other subjects, P. gives very slight evidence of having been influenced in her muscular response, and none of being affected in her estimating: while C. appears to have been influenced only in the latter. Thus of the five

subjects, four give evidence that the estimate is affected by stimulation.

One question we have asked but not yet answered. Does a suggestive and novel motto, while evidently stimulating at the moment seen, cause stimulation or distraction during the moment that, the standard length is exposed for attention? Investigators have sometimes held that addition of numbers or translation from one language into another, etc., constituted distraction when, during the process, certain judgments or responses in other lines were required. Others have held that the mind can pass to another subject, and return, so quickly and thoroughly that the so-called distractive process is no distraction—the mind makes its required outside response in the spontaneous and unnoticed intervals in the period of supposedly continued distraction. But in our work, the mind, after being shown the entertaining motto for two seconds was asked to focus attention on the standard for two seconds, before returning to the motto for two seconds more. Now an excursion from the motto for such a comparatively great length of time could not be made without a forced break in the stream of interesting thoughts aroused by the motto. Such a break we could not expect to occur—the facinating suggestion could not be perfectly banished from the mind for two seconds every time a novel motto was screened and the standard revealed; and there-

fore in our experiment it would seem that the novel mottoes must have constituted a distraction. If, now, distraction existed with N, we should expect that N would show more uncertainty in the judgments—there would be greater average error and probably greater range of variation in the answers. It was therefore assumed that the presence or absence of distraction could be ascertained by a comparison of the average error and the range of variation for R and N.

Table XII gives the results for these two quantities, for the seven subjects in the investigation by the method of reproduction. (It was deemed unnecessary to examine all the data in order to arrive at a conclusion sufficient for our purpose.) Both average error and range of variation are based on groups of nine judgments. The average of each nine was found and then the average error by which the several judgments differed from this average. Then the averages thus found for each group of nine judgments were averaged. This result appears in the table. It could be shown that the average error tabulated as the result of this method of getting an average of averages, might differ from that which could be obtained by taking one average of all the judgments involved without first averaging by groups of nine. But the relation between the values we give for R and N holds good, and its character is made more evident by the "evenness of distribution" brought to light by comparing these

values in groups of nine judgments. The range of variation given in the table is likewise an average of the range found for each group of nine judgments. The standard length was 18cm. Error and range are expressed in millimeters.

Table XII.

Subject	AVERAGE ERROR							RANGE OF VARIATION						
	No. of Groups of Nines Investigated	R	N	Greater is	No. of Groups in which Av. Error for N compared with that for R is—			No. of Groups of Nines Investigated	R	N	Greater is	No. of Groups in which Range for N compared with that for R is—		
					Less	Equal	Greater					Less	Equal	Greater
Miss B	First 8	7.0	8.9	N	1	1	6	all 12	25.8	31.1	N	4	1	7
Miss K	all 12	3.5	3.5	—	5	2	5	all 12	14.3	13.6	R	7	2	3
Mrs. M	all 12	6.7	6.2	R	8	0	4	all 12	26.5	24.8	R	6	0	6
Mr. S	all 12	4.2	4.2	—	6	0	6	all 12	16.6	16.0	R	7	1	4
Mr. C	First 8	2.6	2.6	—	2	1	5	all 12	8.2	9.9	N	2	3	5
Miss P	First 8	3.8	3.5	R	3	2	3	all 12	14.8	13.1	R	7	2	3
Mr. Sm	First 8	3.4	3.3	R	6	0	2	all 12	13.6	13.0	R	5	1	6

From this table it will be seen that of the seven subjects for only one is the average error for N greater than for R, while for three it is equal, and for three smaller. Also, the range of variation is greater for N in but two, and smaller in five. It would therefore appear that if there is any result from N, it is security and not insecurity, of judgment. An examination, however, of the evenness of distribution of average error and range by groups of nine judgments each (see last three columns under each subject) is not quite so favor-

able to N—practically R and N give the same average error and range, when we thus take into account the degree of evenness of distribution.

We conclude that it is improbable that N operated as a distraction. Instead, we ~~will~~ were probably ~~write~~ right in our assumption at the start that preceding suggestiveness and novelty acted as a stimulation to make the person more interestedly alive while the standard was exhibited. (Their net result was not distraction. They may have distracted, but to a less extent than they rendered alive to the desired object.)

Summary and Conclusion.

Our two main problems were as to the effect (1) of suggestion and (2) of stimulation upon the judgment of length. As to the former we have found (1) that printed suggestions in the form of cautions or directions do often influence the judgment of length; (2) that like suggestions in the form, however, of mere isolated words denoting the amount of extension (as Long, Short, do likewise influence; and (3) that both the extent and the direction of influence differ with different persons (some not responding, and some obeying, some disobeying), and sometimes even with the same person at different times (separated by an interval of several weeks).

From one investigation of the second problem we found (1) that generally (three out of our seven subjects) the estimate of

a given length, formed by a person when in a state of stimulation, is, on the average, different from that formed when he is in a dead-level or unstimulated state; and (2) that the law here followed is an individual one, some persons making a greater ~~effort~~ estimate when stimulated than when not, and some the reverse.

Further, in connection with the investigations we had occasion to observe (1) quantitative evidence that differences (between various lengths) are unconsciously emphasized and increased, and (2) that suggestive stimulation immediately before a demand on the attention probably does not give a net result of distraction.

The last point may be considered experimental evidence ~~proving~~ favoring the pedagogical practice of "carrying over" interest from naturally interesting objects to naturally dull subjects of study. In this connection, it might be added that the results of the work in suggestion warrant a pedagogical law, perhaps as yet unformulated, to the effect that a teacher should never give to a class in drawing, for example, such a direction as, "Make the lines long enough," when the intention is simply <u>to advise accuracy</u>, and not to correct a perceived tendency to shorten. We have found that the mere word <u>Long</u> or <u>Short</u> has a tendency upon some persons to affect the results. If accuracy is to be emphasized, therefore, let the caution be free from any word denoting a degree of extension; and, stating the law

generally, a caution advising accuracy should be free from terms suggestive of that which is to be avoided.

In concluding, let it be said that this investigation has impressed upon the writer how great is the unexplored portion of the field of individual psychology. The laws he has sought to formulate are not applicable to everyone. He trusts that he has produced evidence that they hold for individuals; it must be left to many hands to apply them to classes.

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